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DEPARTMENT OF CHEMISTRY

ISOLATION AND CHARACTERIZATION OF THE MAJOR COMPONET OF THE METHANOL EXTRACT OF *MOMORDICA FOETIDA*

ATHESIS SUBMETED TO DEPARTEMENT OF CHEMISTRY IN PARTIAL FULFILEMENT FOR THE DEGREE OF MASTER OF SCIENCE IN CHEMISTRY

BY

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UNIVERSITY OF GONDAR

COLLEGE OF NATURAL AND COMPUTIONAL SCIENCE

DEPARTMENT OF CHEMISTRY

POSTGRADUATE PROGRAM

This is to certify that this thesis prepared by **Melashu Getachew** entitled **ISOLATION AND CHARACTERIZATION OF THE MAJOR COMPONET OF METHANOL EXTRACT OF MOMORDICA FOETIDA** has been submitted for examination with my approval as a university advisor and submitted and approved for the degree of Master of Science in chemistry complies with the regulation and meets the accepted standards with respect to originality and quality

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DECLARATION

First I declare that this thesis is my original work and that all source of materials used for this thesis have been dully acknowledge. This thesis has been submitted in partial fulfillment of the requirements for M.Sc .degree in chemistry at University of Gondar and is deposited at the university library to be made available to borrow under rules of library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma, or certificate

Name; **Melashu Getachew** signature _____

Place; university of Gondar

Date_____

ACKNOWELEDMENT

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LIST OF ABBREVATION

IR	Infrared
MHZ	megahertz
NMR	nuclear magnetic resonance
PTLC	preparative thin layer chromatography
Rf	Retention factor
DEPT	Distortion less enhancement by polarization Transfer
FT-IR	Fourier transforms spectrometry- Infrared

ABSTRACT

momordica foetida is a medicinal plant therefore needs to study. *The objectives of this study was to isolate and characterize the major component of the methanol extract of momordica foetida ,using columon chromatography Accordingly the major component was isolated by a mixture of methanol and chloroform (1:35) respectively . By using spectroscopic technique such as IR, 1HNMR, and ^{13}C NMR, the major component was suggested to have the structure of*

(2E, 4E, 6E)-ethyl 25 hydroxy penta cosa-2, 4, 6-trienoate.This has been done by comparing the spectroscopic data with the values reported from the literature

Keywords *Momordica foetida*, Cucurbitaceae, triterpenoids and cucurbitacins

1. INTRODUCTION

Several classes of natural products of plant species are responsible as traditional medicines for the treatment of disease. In developing countries-all over the world-80% of population continues to use traditional medicine in primary medical problems. Therefore In the past decade research has been focused on scientific evaluation of traditional drugs of plant origin. *Momordica foetida*s is one of such plant that has been frequently used as medicine plant [1].

The plant of Momordica foetida L (cucurbitaceae) is cultivated in Africa, countries. It's becoming a popular food supplement to lower blood glucose worldwide So far, more than 100 compounds, mainly cucurbitane- and oleanene-type triterpenes, have been isolated from the fruits, leaves, and roots of momordica foetida[1].

Momordica foetida is a perennial climbing herb with tendrils; the flowers are cream often with a reddish or orange centre. Male and female flowers are found on the same plant. Characteristic fruit is bright orange with prickles. This species with its beautiful habit but a strong and unpleasant smell [2]

The Cucurbitaceae consist of about 120 genera and 850 species that are widely distributed [3]. Many species are commercially grown for their nutritive value and in some cases they are used for medicinal purposes. In East and Central Africa, M. foetida is used to treat a number of desase which include hypertension, diabetes mellitus, fever and especially symptoms of malaria [4]. Previous photochemical studies resulted in the Cucurbitaceae family. Isolation of cucurbitane triterpenoids from a leaf extract, alkaloids and glycosides from the complete plant [5]

The effects of oxidative stress to a cell vary from cell damage apoptosis or cell suicide to necrosis [6]. Some body organs are predisposed to greater levels of relative oxygen species than others. These are the lungs, brain, eye, liver, kidney and reproductive organs. The lungs are exposed to high levels of high reactive oxygen species because it is exposed to continuous high levels of oxygen. The brain on the other hand is susceptible to oxidative stress since it involves high metabolic activity. The brain is after all the body's main control mechanism; moreover it has low levels of endogenous antioxidants to counteract reactive oxygen species. This organ is

predisposed to formation of reactive oxygen species because it is constantly exposed to damaging ultraviolet. Oxidative stress is thought to contribute to the development of a wide range of diseases including Alzheimer's diseases, Parkinson's diseases, the pathologies caused by diabetes, rheumatoid arthritis and neurodegeneration in motor neuron disease. The use of antioxidants in pharmacology is intensively studied, particularly as treatments for stroke and neurodegenerative diseases. Antioxidants are widely recognized as ingredient and supplement in dietary process in the hope of maintaining health and preventing diseases such as cancer, coronary heart disease and even altitude sickness [7]

Momordica foetida (Cucurbitaceae) is a climber commonly found in swampy areas. It has medicinal uses ranging from spiritual and psychiatric conditions to physical diseases. Drinking of aqueous leaf extracts of the plant for malaria treatment is reported in East and Central Africa [8]. Other medicinal uses of extracts of the plant include the treatment of hypertension, peptic ulcers, diabetes mellitus, and as a purgative. In India, various *medicinal* properties are claimed for Momordica foetida that include antidiabetic, abortifacient, anthelmintic, and contraceptive, antimalarial. And laxative and is used for treatment of dysmenorrhea, eczema, emmenagogue, galactagogue, gout, jaundice, kidney (stone), leprosy, leucorrhea, piles, pneumonia, psoriasis, rheumatism and scabies It contains biologically active chemicals that include glycosides, saponins, alkaloids, fixed oils, triterpenes, proteins and steroids[8]. The immature fruits are a good source of Vitamin "C" and also provide Vitamin "A", phosphorus, and iron. Several photochemical such as momordenol, momordicilin, momordicins, momordin, momordolol, cryptoxanthin, cucurbitins, cucurbitanes, cycloartenols, diosgenin, elaeostearic acids,erythrodiol, galacturonic acids, gentisic acid, goyaglycosides, goyasaponins, multiflorenol, have been isolated[9]. These are reported in all parts of the plant. The hypoglycemic chemicals of plant are a mixture of steroidal saponins known as charantins, insulin-like peptides and alkaloids and these chemicals are concentrated in fruits [9],

2. LITERATURE REVIEW

2.1. Scientific classification

Kingdom:	Plantae
(unranked):	Angiosperms
(unranked):	Eudicots
(unranked):	Rosids
Order:	Cucurbitales
Family:	Cucurbitaceous
Genus:	*Momordica*
Species:	M. foetida

2.2. Geographical distribution

Momordica foetida occurs in forest edges and clearings, margins of swamps and on disturbed ground as a weed and colonizer, up to 2400 m altitude. *Momordica foetida* is a climbing vine native of tropical Africa south africa and Ethiopia closely related to the bitter melon (*M. charantia*) and balsam appl (*Momordica foetida)* is widespread in tropical Africa and in South Africa.

Its species name ("bad-smelling") refers to its unpleasant smell. It was previously named *M. morkorra* and *M. cordata* (Cogn.) Considered an indicator of soil suitable for growing cacao *[10]*.

2.3. Physical characteristics of the plant *Momordica foetida*

Leaves have a bitter taste and foetid smell when crushed. Their nutritional composition per 100 g edible portion is: energy 92 kJ (22 kcal), protein 3.3 g, fibre 3.2 g, Ca 1.1 mg, , Zn 0.4 mg, β-carotene 5.4 mg,[11]. Triterpenes of the cucurbitacin type, found in both *Momordica charantia* and *Momordica foetida*, particularly in the fruits, leaves and seeds, are potentially cytotoxic. Momordicines and foetidin (identical to charantin) were reported from fruits and leaves of

Momordica foetida. Dioeciously, perennial herb, trailing or climbing with simple or bifid tendrils; stem up to 4.5 m long, with dark green flecks when young, woody when old, rooting at the nodes. Leaves alternate, simple; stipules absent; petiole 1.5–17 cm long; blade broadly ovate-cordate to triangular-cordate, 1.5–16 cm × 1.5–17 cm, base deeply cordate. Flowers unisexual, regular, 5 -merous; calyx with obconic tube and lobes up to 11 mm long; petals free, obovate-lingulate, up to 3.5 cm long, white, pale yellow to orange-yellow, 3 with scales inside at base; male flowers 1–9 together in fascicles on peduncle 2–23 cm long, with 3 stamens, anthers coherent in centre of flower; female flowers solitary in leaf axils, with inferior, ovoid ovary, stigma [12].

2.4 Uses of *momordica foetida* in Africa

The leaves of *Momordica foetida* are collected from the wild and eaten after boiling as a vegetable in Gabon, Sudan, Uganda, Tanzania and Malawi. They seem fairly unpopular and are eaten in small quantities only, usually in times of scarcity. The pulp of ripe fruits is eaten in Ghana, Gabon, Suda, Kenya,uganda and Tanzania[13].
The plants are grazed by cattle in Sudan. Leaves are used as fodder (Kenya, Tanzania) and are said to be especially suitable for fattening rabbits. However, there are reports from Kenya that cattle avoid it and that it is poisonous.

Traditional medicinal uses are numerous and many are shared with other *Momordica* spp. The juice of crushed leaves is used to relieve cough (Uganda), stomach -ache (Uganda), intestinal disorders (Nigeria, South Africa), headache (Burundi, Uganda, Malawi), earache (Tanzania), toothache (Uganda) and as an antidote for snakebites (Tanzania)[13]. Skin problems caused by smallpox (Côte d'Ivoire), boils (South Africa), spitting cobra poison and malaria are treated with crushed leaves. The plant is further used as emmenagogue (Côte d'Ivoire), ecbolic (Côte d'Ivoire, Gabon, Uganda, Tanzania), aphrodisiac (Côte d'Ivoire) and abortifacient (Uganda).The roots, said to be poisonous, and the crushed seeds are used in East Africa to cure constipation. The fruit pulp is said to be poisonous to, moths and ants, and is used as an insect repellent in Tanzania. [13].

Fig. 1.picture of momrdica foetida

2.5. Chemistry of cucurbitane of mmordica foetida

Cucurbitane is a chemical compound with formula $C_{30}H_{54}$. It is a polycyclic hydrocarbon, specifically a triterpene. It is an isomer of lanostane (specifically 19(10→9β)*abeo*-lanostane), from which it differs by the formal shift of a methyl group (carbon number 19) from the 10 to the 9β position in the standard steroid numbering scheme [14]

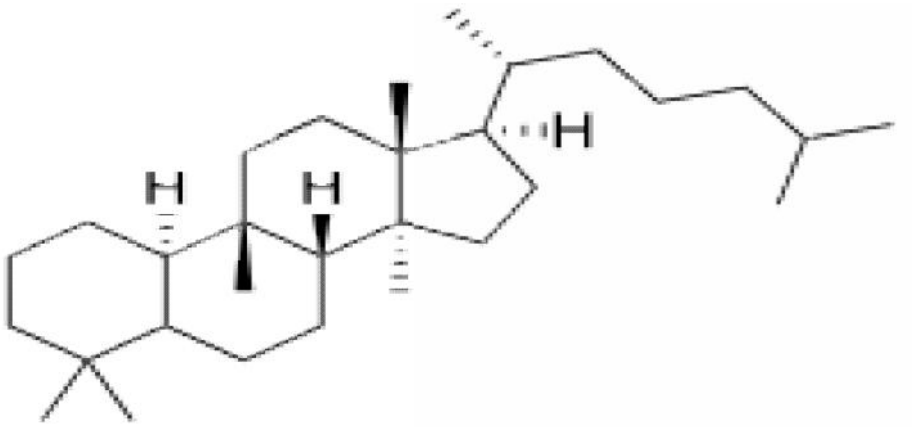


Fig.2. general structure of cucurbitane

Compounds with the basic cucurbitane skeleton are found in many plants, and some are important phytopharmaceuticals[15]Natural cucurbitane-related compounds include Balsaminapentaol, from (*Momordica balsamina*.,) Balsaminol A, from (*Momordica balsamina).* Balsaminol B, from(*Momordica balsaminan),* Brydioside A from (*Bryonia dioica* Bryoamaride) and derivatives from *Bryonia dioica* Charantin or foetidin, from (*Momordica charantia*) and (*Momordica foetida)* Charantosides , from (*Momordica charantia)* Cucurbalsaminol B, from (*Momordica balsamina*) and from *Momordica balsamina*,Cucurbitacins A-L, O-T Datiscosides, from (*Datisca glomerata*) Endecaphyllacins A and B, from roots of (*Hemsleya endecaphylla* and *Hemsleya panacis)-scandens* Spinosides A and B, from (*Desfontainia spinosa*)[16]

2.6. Cucurbitacin

Courgettes (zucchini), together with many closely related species of the *Cucurbitacea* family, including cucumber and squash, produce an intensely bitter group of compounds known as cucurbitacins[17]. The cucurbitacins are highly oxygenated triterpenoid compounds and are divided into twelve different categories according to their structure. They are potent toxins with natural insecticidal and/or fungicidal properties [17]

Cucurbitacin is any of a class of biochemical compounds that some plants notably members of the family Cucurbitaceae, that includes the common pumpkins and gourds developed in order to defined themselves from herbivores. Cucurbitacins are chemically classified as steroids, formally derived from cucurbitane, a triterpene hydrocarbon specifically, from the unsaturated variant cucurbita-5-ene, or 19-(10→9β)-*abeo*-10α-lanost-5-ene. They often occur as glycosides. They and their derivatives have been found in many plant families including Brassicaceae, Cucurbitaceae, Scrophulariaceae, Begoniaceae, Elaeocarpaceae, Datiscaceae[17],

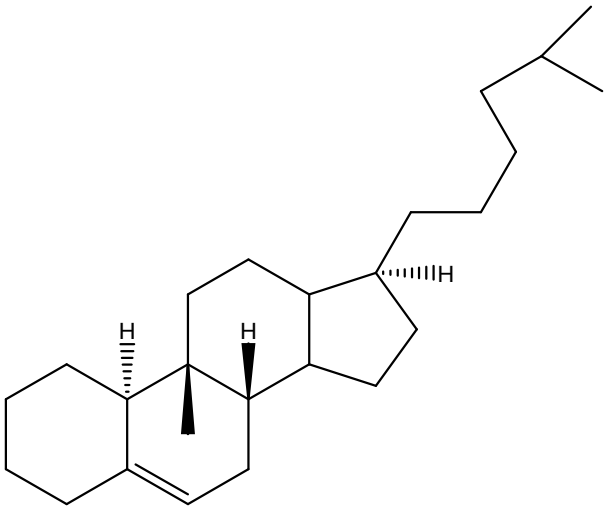


Fig.3.Cucubita-5-ene with standard carbon numbering

Cucurbitacin A,Cucurbitacin B, , Cucurbitacin D, , Cucurbitacin I, , Cucurbitacin Q, , [17] are some compounds shown in the figures below.

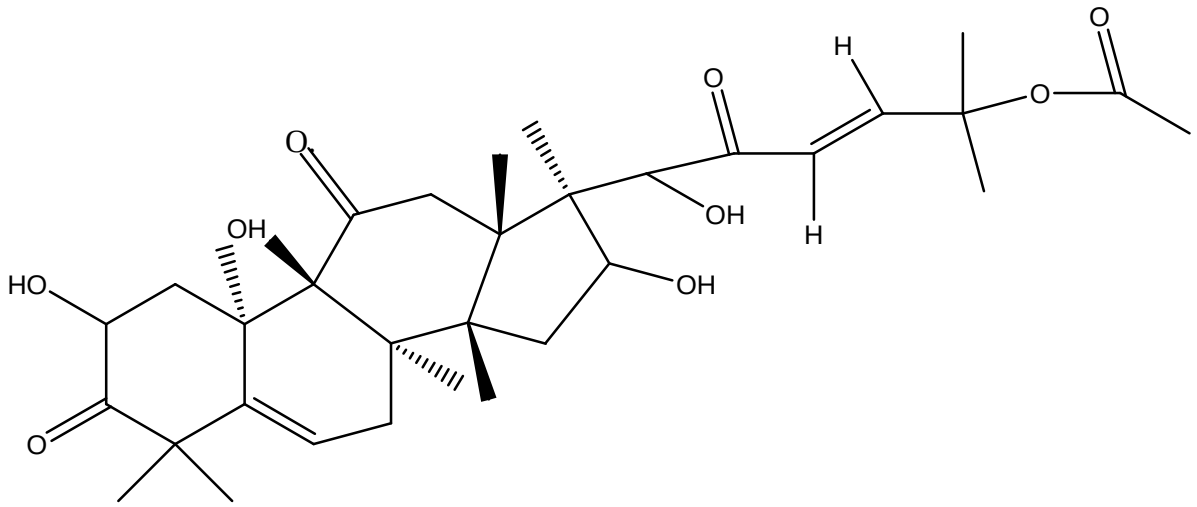


Fig.4 cucurbitacin A

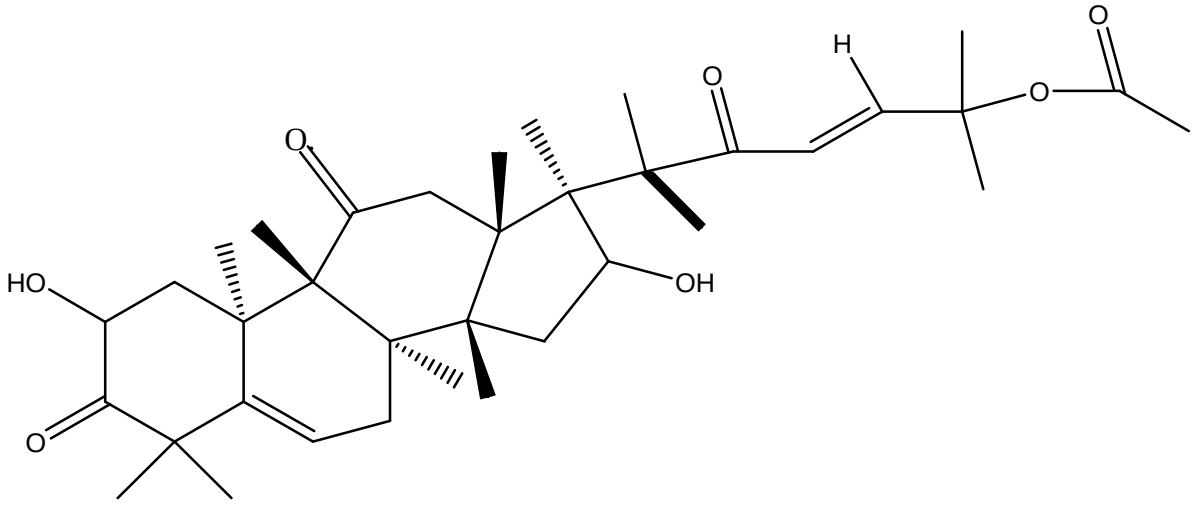


Fig 5 cucurbitacin B

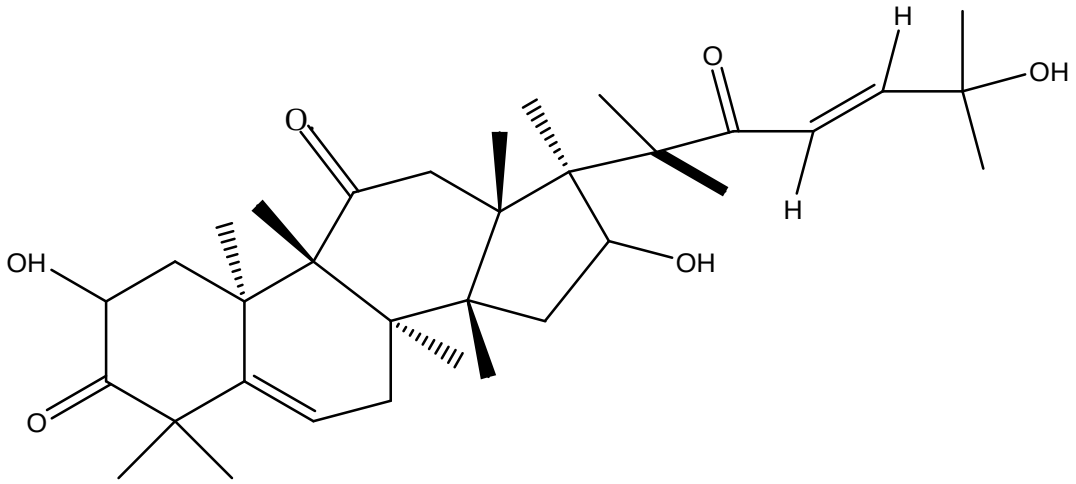


Fig 6.cucurbitacin D

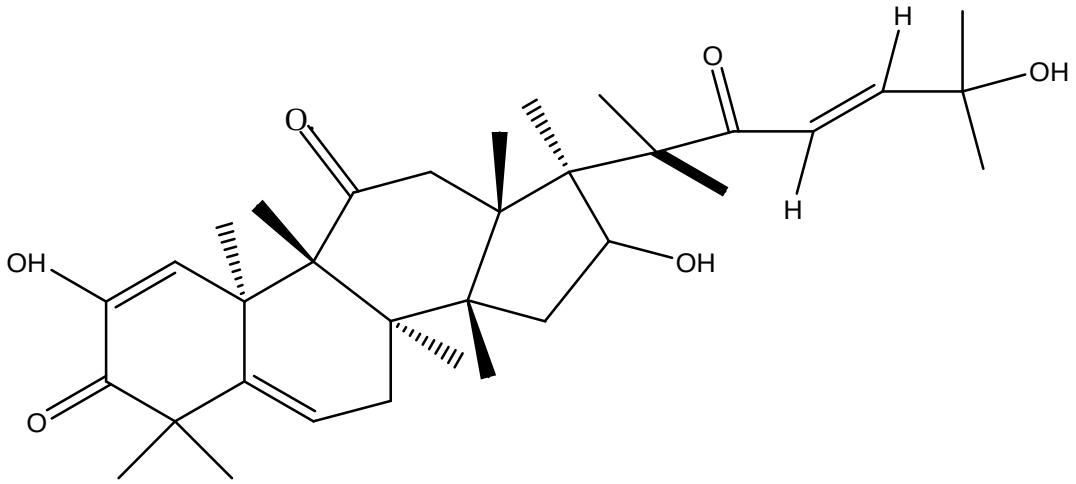


Fig 7. cucurbitacin I

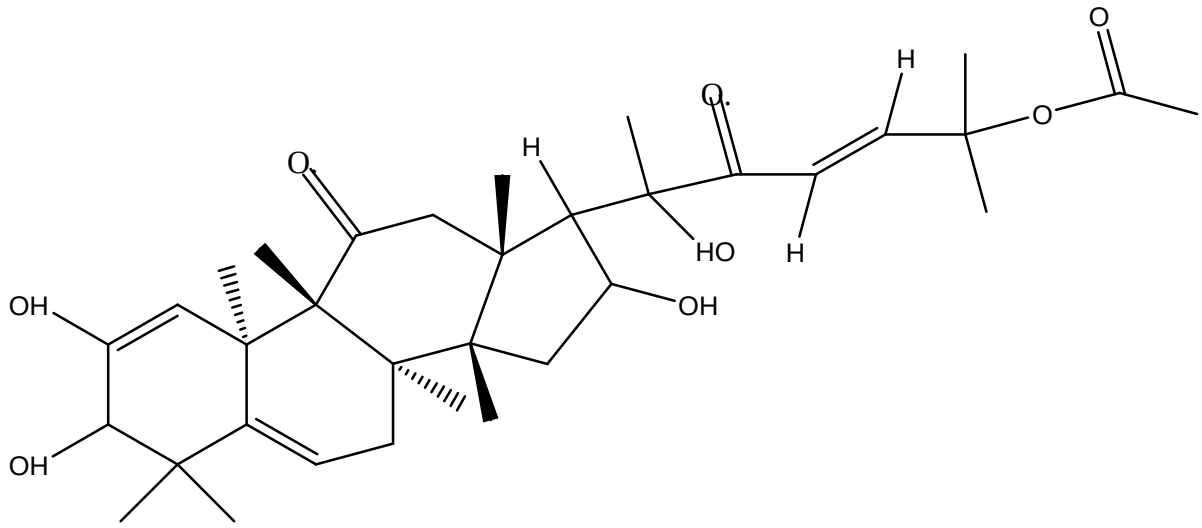


Fig 8.cucurbitacin Q

Some secondary metabolites isolated from the leaves momordica foetida are shown in the figure below

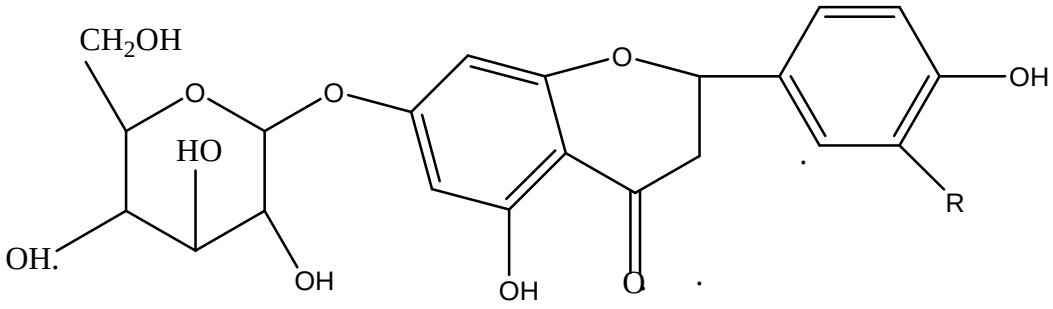


Fig.9 structure of prunin

1 R=H = 5, 7, 4-Trihydroxyflavnone-7-O-β-D glycopyranoside=prunin

2 R=OH =5, 7, 3, 4 Tetrahydroxy flavnone --7-O-β-D glycopyranoside glycopyranoside

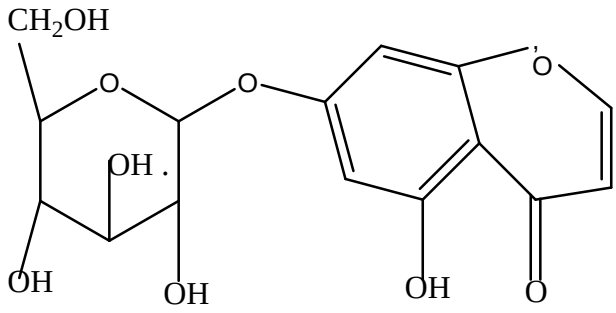


Fig.10. 2,5,7-Dihydroxychromone-7-O-β-D-glucopyranoside

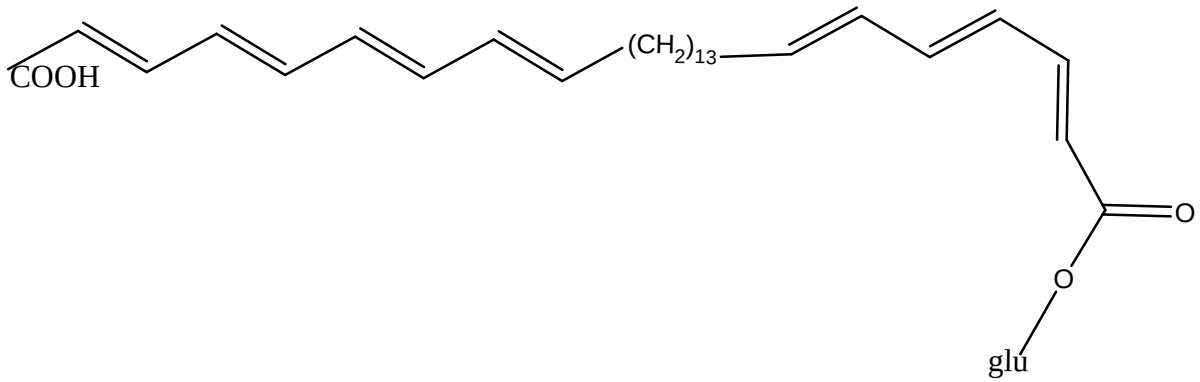


Fig.11.(2E,4E,6E,21E,23E,25E,27E,)-methyl nonacosa-2,4,6,21,23,25,27-heptaenoate

3. OBJECTIVES OF THE STUDY

3.1. General objective

The main objective of this study was to isolate the major components of the methanol extract of momordica foetida and characterization of its structure

3.2. Specific objectives

- To isolate compound(s) from momordica foetida by using chrmomatographic technique
- To elucidate the structure (s) of isolated compound using different spectroscopic technique

4. EXPERIMENTAL

4.1. Material and method

4.1.1. Plant material collection and preparation

The leaves of momordica foetida material (leaves 1 kg) were collected from amhara region from Gondar city of Azezo kebele and was deride in air. The derid plant material was crushed in to small pieces and powdered and made ready for extraction. Extraction and isolation of individual component were done at University of Gondar department of chemistry; NMR and IR were done at Addis Ababa University

The dried leaves of momordica foetida were cleaned by removing the dust and other unwanted particle using dry cotton cloth. The dried and cleaned momordica foetida was crushed in to powder by an electrical grinder

4.1.1.2 Chemical and apparatus

Grinder(K-M20-WEKEE)sonic, rotaryevaporate, TLCplate, perparative TLCplate, beaker (different size), test tube, watch glass, glass road, cotton, measuring cyilinder, suction flask, oven, wireloop, autoclavehood, buchner funnel, filter paper, referigerater, reagent bottle (different size),electronics balance, analytical balance, NMR machine(Bruker avance 400NMR spectro at 400MHZ), silicalgel(60-120slash), petroleumether, diethylether, methanol, chloroform, iodine

4.1.1.3. Spectroscopic methods

4.1.1.3.1 Nuclear magnetic resonance Spectroscopy

NMR spectra were recorded on JNM-L-400spectro meter instrument operating at 400MHZ for ^{1}HNMRAnd100MHZ for ^{13}C at room temperature using $CDCl_3$ at chemistry departement,Addis ababa university, region from o to 12ppm for ^{1}H and 0 to 220 ppm for ^{13}C

was employed for scanning. Signal using referred to internal standard tetra methyl silane(TMS) chemical shift are reported

4.1.1.3.2 Infra Red spectroscopy (FT-IR)

Infra red spectra was recorded on shimadzu 100-FTIR spectroscopic at AAU

4.2. Procedure

4.2.1. Extraction

Air dried leaves of momordica foetida of powder (320 g) were mixed with methanol of 2 L for 84h and were placed in large round bottom flask and mechanically shacking for 5h .The suspension was filtered through Buchner funnel and the solution was allowed to stand overnight in refrigerator. The methanol extract was evaporated and concentrated under rotary evaporator. The aqueous layer was extracted with chloroform and methanol in the ratio of 35:1 respectively, and then this crude sample was checked by TLC showed four different spots

4.2.2. Isolation and purification

The 4g crude extract was dissolved in methanol and chloroform and applied to column chromatography(2.5 x 34cm) packed with 100g of silical gel. The sample was then eluted with a mixture of chloroform and methanol in the ratio of 35:1 until the sample is completely removed from the column.50 fractions was collected. The fractions that have similar Rf vales were combined. The fraction collected and combined had green,yellow,blue,and black colors .Out of these the yellow colored fraction was found to be the major component as observed by TLC and it was further purified by preparative thin layer chromatographic sent for spectral analysis to department of chemistry ,Addis Ababa university.

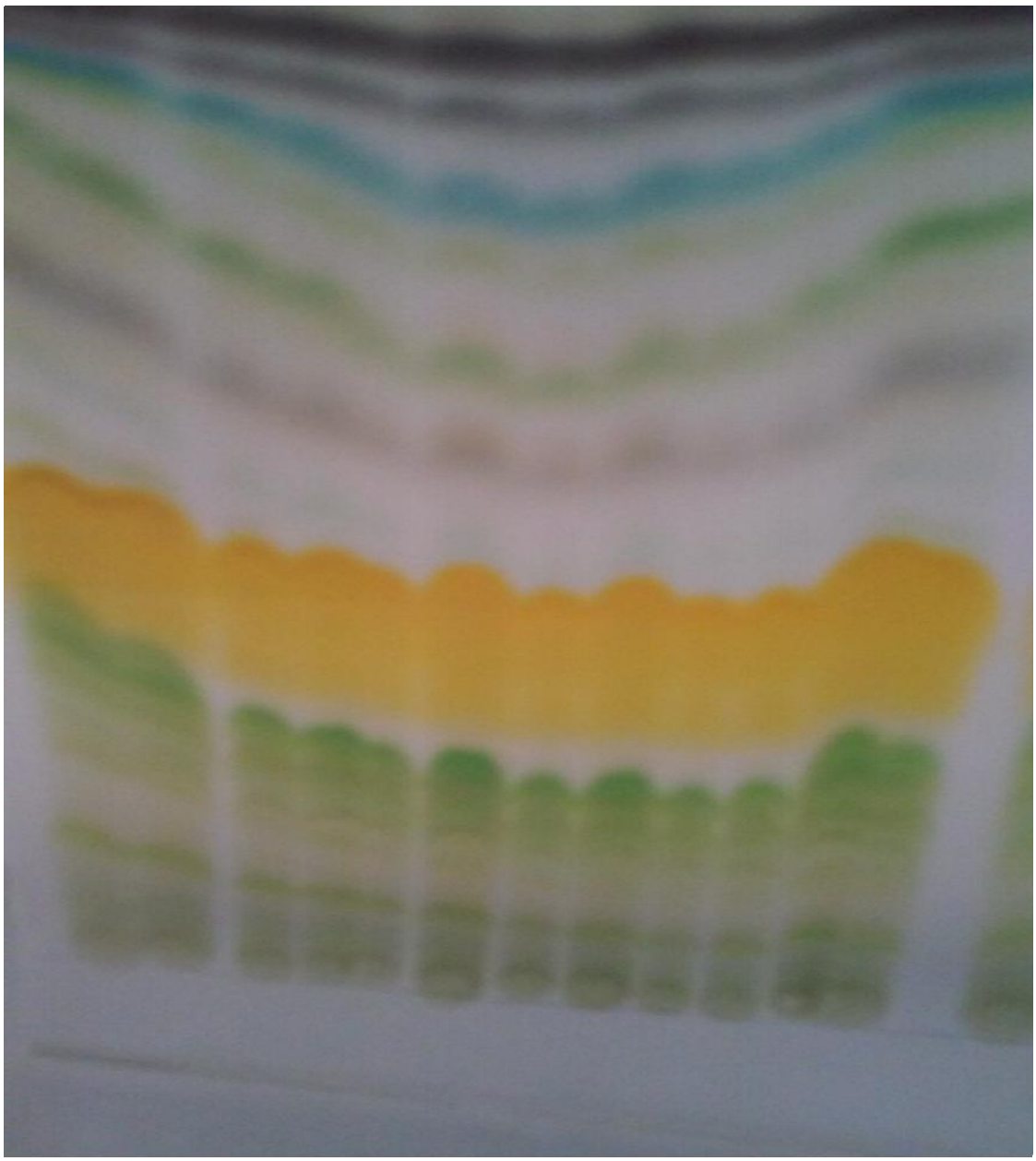


Fig 12. Picture of the PTLC of the methanol extract of M.foetida in suitable solevents

5. RESULTS AND DISCUSSION

5.1. Partial characterization of the isolated compound

The isolated compound has a deep yellow color and this was due to the presence of extended conjugation. The R_f value of the isolated compound was 0.45 in 35:1 ratio chloroform and methanol respectively

5.2. Spectral analysis of the isolated compound

5.2.1. IR spectrum data of isolated compound

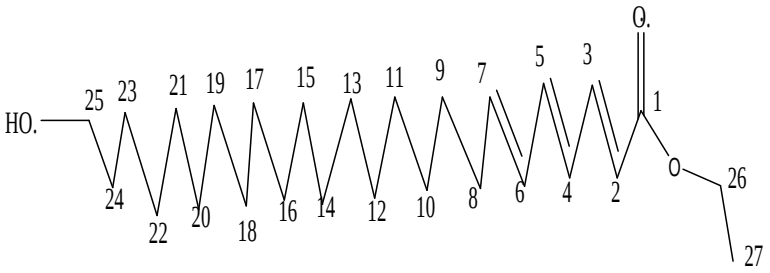
In the IR spectrum of the compound (appendix1) gave abroad band at 3431cm $^{-1}$ due to hydrogen-bonded OH group. The strong absorption band at 1720cm^{-1} due to the carbonyl group of an ester conjugated with a double bond. The bond at 1632cm^{-1} could be due c=c stretching. The absorption bands at 2928cm^{-1} and 2848cm^{-1} were assigned for sp^3 C-H stretching and at 3000cm^{-1}for sp^2 C-H stretching(C=C-H). Finally the absorption band at 1463cm^{-1}for CH_2 bending, 1278cm^{-1} for CH_3 bending, 746 cm^{-1} for CH_2 rocking and 1125cm^{-1} and1068cm^{-1}for C-O stretching were respectively assigned by referring IR values from table.

Table.1IR absorption band of compound

Type of phenomenon	Wave number(cm^{-1})
Hydroxyl(OH) group stretching	3431
Carbonyl group of ester(-o-c=o)	1720
Double bond(C=C)stretching	1632
$SP^3(CH_3)$ stretching	2928 and2848
HC =CH stretching(C-H)	3000
CH_2 bending(C-H)	1463
the band in C-O	1125and1068
CH_3 bending	1278
CH_2 rocking	746

5.2.2.[1] HNMR Spectrum data analysis of isolated compound

The [1]H NMR spectrum (appendix2) showed overlapped signals for the proton in the compound. This situation happened because the protons in the compound are in similar chemical shift environment. By considering the knowledge of chemical shift, intensity and deshilding effect of electronegative element, the signal at δ of 1.95ppm, 2.4ppm, 1.85ppm, 1.75ppm, and1.3ppm were assigned for the methylene group of the long chain and the signal at δ 1.1ppm for a methyl group. The set of signal at δ 5.4ppm, 6.15ppm, 6.3ppm, 6.35ppm, 6.4ppm and6.7ppm for the olefinic proton, finally the signal at δ 2ppm for -OH and at δ the 5.4ppm for OCH_2 proton .These chemical shift have been compared with the reported value from literature and were found to be in agreement, (Table 2 below).



(2E, 4E, 6E)-Ethyl- 25- hydroxy penta cosa-2, 4, 6-trienoate

Fig.13. Suggested Structure of isolated compound

Table.2 Comparison of the observed 1H NMR (400MHZ, CDCl3) spectroscopic data of the compound with the reported value

Carbon number	proton	Shift ppm	From literature,ppm
C1	-	-	-
C-2	CH	6.15	5.72
C-3	CH	6.7	7.5
C-4	CH	6.4	6.51
C-5	CH	6.35	6.51
C-6	CH	6.3	6.27
C-7	CH	5.4	6.05
C-8	CH_2	1.81	1.96
C-9	CH_2	1.75	1.33
C-10	CH_2	1.3	1.29
C-11	CH_2	1.3	1.29
C-12	CH_2	1.3	1.29
C-13	CH_2	1.3	1.29
C-14	CH_2	1.3	1.29
C-15	CH_2	1.3	1.29
C-16	CH_2	1.3	1.29
C-17	CH_2	1.3	1.29
C-18	CH_2	1.3	1.29
C-19	CH_2	1.3	1.29
C-20	CH_2	1.3	1.29
C-21	CH_2	1.3	1.29
C-22	CH_2	1.3	1.29
C-23	CH_2	1.3	1.29
C-24	CH_2	1.95	1.48
C-25	CH_2	2.85	4.19
C-26	CH_2	5.4	3.53
27	CH_3	1.1	1.3

5.2.3. The ^{13}C -NMR and DEPT spectra data of isolated compound

The proton decoupled ^{13}C NMR spectrum (appendix-3) showed signals for 27 carbon atoms for the compound. Out of this, the signal at 178.91ppm is assigned for the carbonyl carbon atom. The signals at131.97,130.25,128.29,128.25,127.75,and127.11ppm are assigned for the six olefinic carbon atoms the peaks at 65 and 61.5ppm are assigned for OCH_2 and CH_2OH carbon atoms respectively .The signal at 14.27ppm is assigned for the methyl carbon atom. The remaining signals are assigned for the long chain methylene groups of the compound by considering the DEPT spectrum .The proton decoupled 13C NMR and DEPT spectra of the suggested compound were compared from the values reported from the literature and are shown in table 3 below.

Table.3 proton decupled 13NMR and DEPT spectroscopic data of the compound and reported values from literature

Position of carbons	13 C NMR data(δ in ppm)	From literature review	DEPT135 data(in ppm)	Remarks
C-1	178.91	166.5	178.9	Carbonyl carbon
C-2	127.11	118.2	127.11	CH
C-3	131.97	144.4	131.97	CH
C-4	128.25	130.4	128.25	CH
C-5	128.29	130.4	128.29	CH
C-6	127.75	128.8	127.75	CH
C-7	130.26	135.7	130.26	CH
C-8	29.69	33.8	29.69	CH_2
C-9	29.44	30.1	29.44	CH_2
C-10	29.36	29.8	29.36	CH_2
C-11	29.36	29.8	29.36	CH_2
C-12	29.36	29.7	29.36	CH_2
C-13	29.36	29.7	29.36	CH_2
C-14	29.36	29.7	29.36	CH_2
C-15	29.36	29.7	29.39	CH_2
C-16	29.36	29.7	29.36	CH_2
C-17	29.36	29.7	29.36	CH2
C-18	29.36	29.7	29.36	CH2
C-19	29.36	29.7	29.36	CH_2
C-20	29.36	29.7	29.36	CH_2
C-21	29.36	29.7	29.36	CH_2
C-22	29.36	29.7	29.36	CH_2
C-23	25.53	25.7	25.53	CH_2
C-24	29.56	32.3	29.56	CH_2
C-25	65	62.9	65	CH_2
C-26	61.5	61.4	61.5	CH_2
C-27	14.27	14.2	14.27	CH_3

The spectroscopic data obtained for the compound are in agreement with the reported values from the literature and hence the most probable structure of the compound could be (2E, 4E, 6E)-ethyl- 25- hydroxy penta cosa-2, 4, 6-trienoate as shown in fig 13 above.

6. CONCLUSION AND RECOMMENDATION

6.1. Conclusion

The major component of the methanol extract of momordica foetida was suggested to have the structure of (2E, 4E, 6E)-ethyl-25- hydroxy pentacosa-2, 4, 6-trienoate.This structural characterization has been performed by comparing the spectroscopic data with the value reported from the literature. In order to confirm the suggested structure further other spectroscopic techniques such as UV-visible, mass spectroscopic and 2D nuclear magnetic resonance spectroscopic such as COSY and HETCOR have to be done

6.2. Recommendation

The methanol extract of momordica foetida have additional component other than the isolated compounds further isolation and characterization of those compound shall be done in University of Gondar in the department of chemistry. In addition momordica foetida is medicinally important plant .Therefore in addition to isolation and characterization Anti-microbial activities have to be performed using the standard method

7. REFERENCE

[1]. Hakizamungu, E.; Vanpuyvelde, L.; Wery, M. Screening of Rwandese Medicinal- Plants

[2]. Basch, E.Gabardi, S. Ulbricht, C. Bitter melon (Momordica charantia): a review of efficacy

[3] Jeffrey C. [1990]. Cucurbitaceae flora of tropical East Africa

[4] .Hakizamungu, E., Van Puyvelde, L., Wery, M[1992]. Journal of thnopharmacology

[5]. Olaniyi A.A. [1975]. A neutral constituent of Momordica

[6] .Whiltaker B.S., Berlett E.R. and Stedtman R.R. (1997). Proteinoxidation in aging iseases

[7]. Davies K. [1995] .Oxidative stress: the paradox of aerobic life

[8]. Raman, A., Lau, C., [1996]. Phytomedicine, 349–362.

[9]. Husain, J., Tickle, I.J., Wood, S.P.[1994]. FEBS Letters342, 154–158

[10]. Jump up to: Burkill, H. M. [1985]. *The Useful Plants of West Tropical Africa*

[11]. Nesamvuni, C., Steyn, N.P. & Potgieter, M.J., [2001]. Nutritional value of wild,

Leafy plants consumed by the Vhavenda. South African Journal of Science

[12]. Jump up ^ Mulholland, D. A.; Sewram, V.; Osborne, R.; Pegel, K. H.; Connolly, J. D

.997]. "Cucurbitane triterpenoids from the leaves of *Momordica foetida*".

[13]. Burkill, H.M., [1985]. The useful plants of West Tropical Africa. 2nd Edition.

Volume Families A–D. Royal Botanic Gardens, Kew, United Kingdom.

[14]. Jump up to: IUPAC Commission on the Nomenclature of Organic Chemistry and

IUPAC-IUB Commission on Biochemical Nomenclature [1969]*TheNomenclatue of Steroids*

[15]. Jump up to: Chen, J. C.; Chiu, M. H.; Nie, R. L.; Cordell, G. A.; Qiu, S. X.

[2005]. "Cucurbitacins and cucurbitane glycosides: Structures and biological ctivities". J. U.

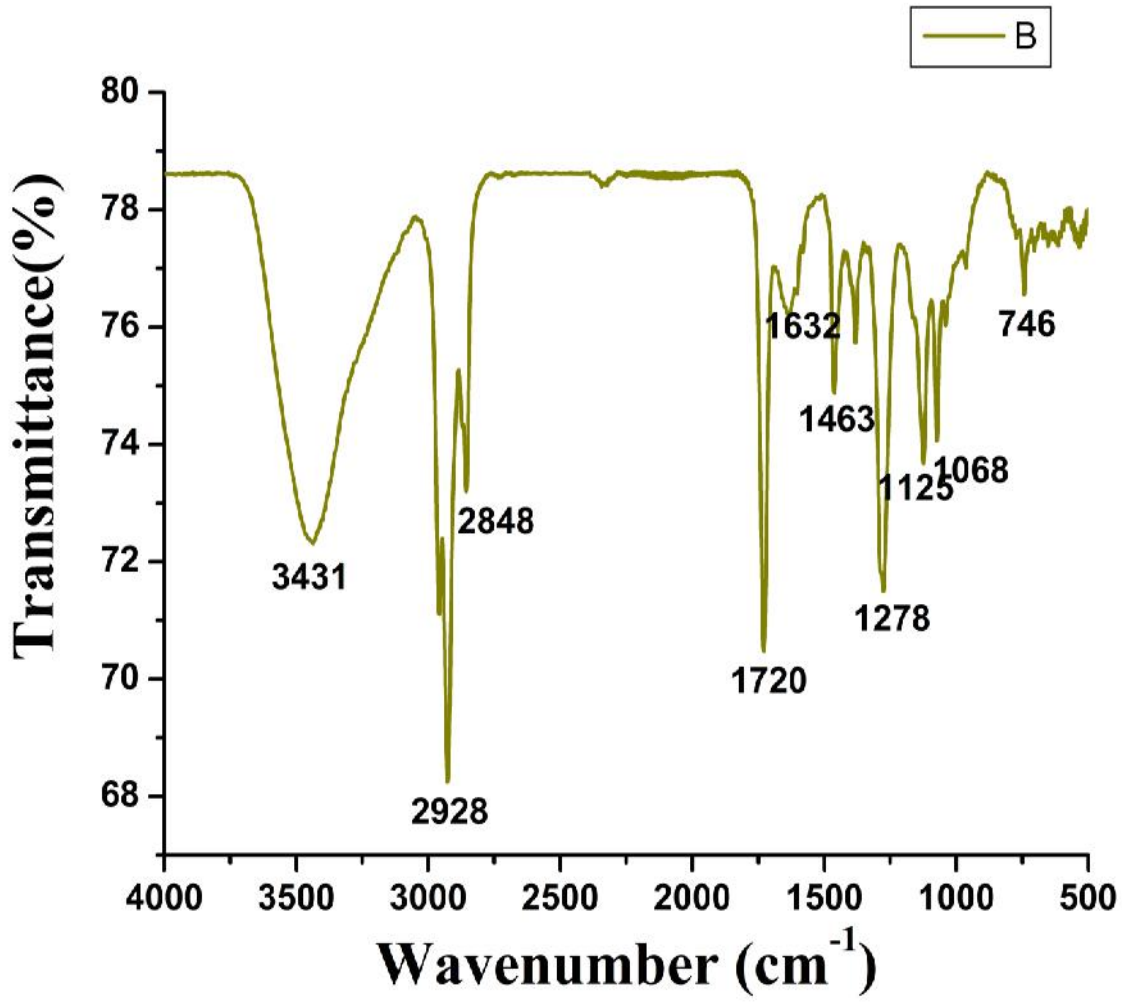
[16]. Cucurbitacins Judy Davis - November [2007]

[17]. Zapesochnaya GG, Kurkin VA, Braslavskii VB, Filatova NV Phenolic Compounds of Salix acutifoliaBark Chem Nat Compd 38: 314-318

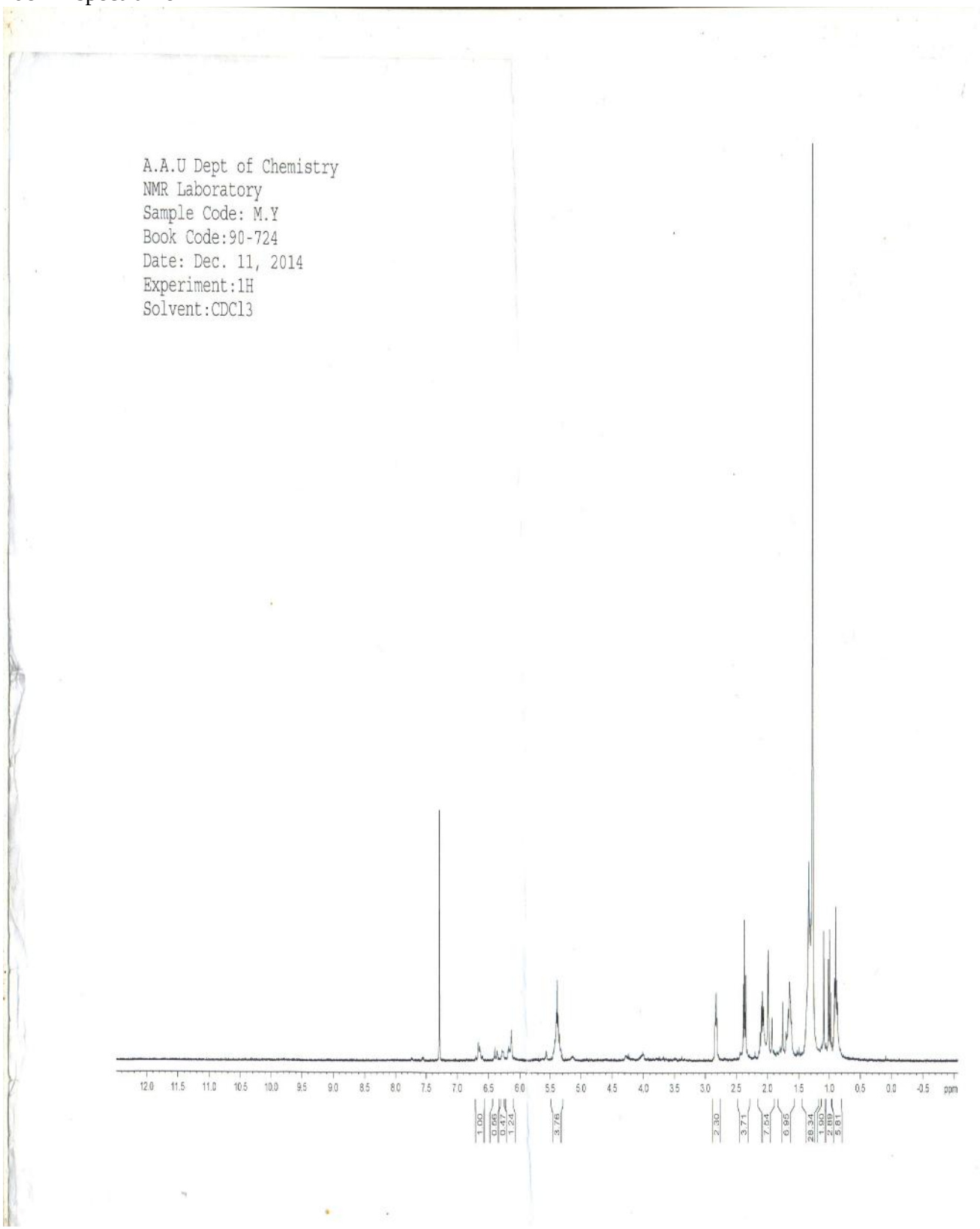
8.1APPINDEX

Appindex-1-spectrum, FT-IR

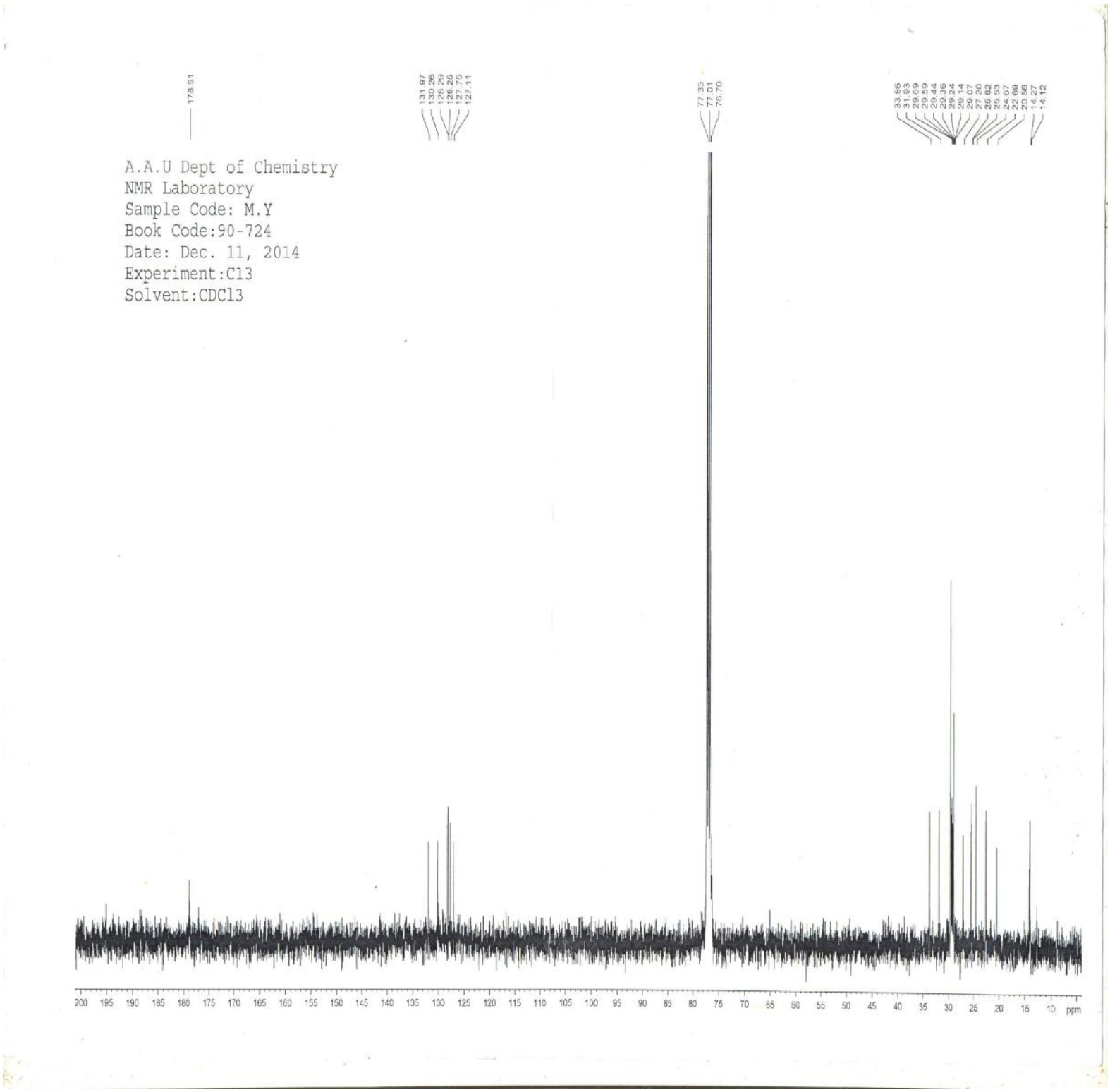
In Addis ababa University



Appindex-2-spectrumof1HMNR



Appindex-3-spectrum of 13C NMR



Appindex -4- spectrum of DEPT OF 13C NMR